

REMARKS

At the outset, the Examiner is thanked for the consideration of the pending application. The Office Action dated October 12, 2010 has been received and its contents carefully reviewed.

Claims 1 and 30 are hereby amended. Support for the claim amendments can be found, for example, at Specification, page 13, lines 20-28, and page 23, lines 11-20. No new matter has been added. Accordingly, claims 1-27 and 29-46 are currently pending. Reconsideration of the pending claims are respectfully requested.

The Office Action rejects claims 1, 4, 10-12, 15, 17, 19, 20, 29, and 32 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,210,894 to Brennan (*Brennan*). Applicants respectfully traverse the rejection.

To anticipate a claimed invention the prior art must disclose all the elements of the claim. *Brennan* fails to disclose all the elements of claims 1, 4, 10-12, 15, 17, 19, 20, 29, and 32, and thus cannot anticipate these claims.

Claim 1 recites “a substrate comprising an active surface that is substantially non-wetting with respect to a liquid of interest, a plurality of capture zones for the localized capture of a drop of said liquid of interest formed on said active surface, the capture zones being placed apart on the active surface and being wetting with respect to said liquid of interest, a plurality of operating zones formed on said active surface and separate from the capture zones arranged so that said capture zones surround the operating zones continuously or discontinuously, in such a way that the operating zones are at least partially covered by the drop of the liquid of interest when said drop is captured by said capture zones, each operating zone being a zone in which physical and/or chemical and/or optical operations are carried out in the drop of the liquid of interest, means for supplying the liquid of interest that make it possible to leave a drop of said liquid of interest on said capture zones, wherein at least one operating zone is a zone that is substantially non-wetting with respect to said liquid of interest.” *Brennan* fails to teach these elements of claim 1.

The Office Action states “[f]or claim 1, Brennan teaches a substrate comprising an active surface that is non-wetting with respect to a sample liquid (column 4 lines 38-43), a capture zone and an operating zone (column 5 lines 5-23, column 7 lines 14-26), and a means for supplying the sample liquid (column 5 lines 56-61).” *Office Action*, page 2.

Applicants respectfully disagree. *Brennan* does not disclose a device with operating zones surrounded by capture zones wherein the capture zones and operating zones are distinct in terms of wettability and function. The device of *Brennan* includes a substrate with active surface and the active surface includes binding site regions. Note that, the active surface is hydrophobic, and the binding site regions (second regions) are derivatized hydrophilic binding site regions. *Brennan*, column 5, lines 5-23. Thus, in *Brennan*, the active surface can be substantially non-wetting with respect to a liquid of interest, while the binding site regions are wetting with respect to said liquid in order to capture it. The first function of these binding site regions is to capture the liquid of interest. Therefore, these binding site regions constitute capture zones.

Additionally, these binding site regions can be chemically reactive to bind nucleic acids, to bind oligonucleotides of known sequence, or to bind peptides. *Brennan*, column 3, lines 9-13 and column 3, lines 21-33. In the passage cited by the Office Action (*Brennan*, column 5, lines 5-23), the “second regions” are defined as derivatized by hydrophilic groups “suitable for anchoring solid phase oligonucleotide synthesis.” Accordingly, these binding site regions constitute operating zones in which physical and/or chemical and/or optical operations are carried out.

Because, in *Brennan*, the operating zones are hydrophilic and thus wetting with respect to the solution used during the solid phase oligonucleotide synthesis (*Brennan*, column 7, lines 40-42), the operating device is different from the device as recited in the amended Claim 1.

The Office Action further states “one of ordinary skill in the art could easily interpret figure 6 of Brennan as being a plurality of hydrophobic regions surrounding a plurality of hydrophilic regions without having the entire surface of the substrate treated to be hydrophobic.” *Office Action*, page 13.

Again, Applicants respectfully disagree with the Office Action's interpretation of figure 6 of *Brennan*. In Figure 6, the circular regions that are not bound to any nucleotides are "individual dots" as any circle on the array plate either bound to or not bound to a nucleotide. Some of the circular regions are not yet bound to any nucleotides because the moving array plate has not yet placed them below the jet heads of the piezoelectric impulse jet pump apparatus. Furthermore, in figure 6, the circular regions either bounded to or not bounded to nucleotides are hydrophilic. *Brennan*, column 1, Example 1 (the preparation process of the array). When these circular regions are bounded to nucleotides, physical and/or chemical operations have been carried out in these regions. Thus, these circular regions have the same function as the operating zones as recited in claim 1.

Because these regions are also wetting with respect the solution used during the solid phase oligonucleotide synthesis (*Brennan*, column 7, lines 40-42), they do not read on the operating zones recited in claim 1. Therefore, the device disclosed at Figure 6 is consequently different from the operating device as recited in claim 1.

The Office Action also states "Brennan at figure 3c clearly shows this arrangement as the O-N region is covered by droplet and the F regions are not covered by the droplet." *Office Action*, page 14.

Again, Applicants respectfully disagree. In the present invention, the operating zones are not only non-wetting with respect to the liquid of interest but also partially covered by a drop of said liquid of interest. Indeed, the operating zones are covered by the liquid of interest due to the arrangement between the capture zones and the operating zones, not the chemical nature of their surface. In contrast, in figure 3c of *Brennan*, the O-N region is covered by a droplet because the O-N region is wetting with respect to the liquid of interest used during the solid phase oligonucleotide synthesis. *Brennan*, column 7, lines 40-42. The O-N region is suitable for anchoring solid phase oligonucleotide synthesis. Even if this O-N region had the same function as the operating zones of claim 1, the O-N region and the operating zones would still differ from each other because the O-N region is wetting with respect to the liquid of interest while the operating zone of claim 1 is non-wetting with respect to the liquid of interest.

In addition, in Figure 3c, the F regions are non-wetting with respect to the liquid of interest used during the solid phase oligonucleotide synthesis, and no physical and/or chemical and/or optical operation is carried out on F regions. Clearly, the F regions correspond to the active surface which surrounds the operating and capture zones and which is non-wetting with respect to the liquid of interest in the device as recited in claim 1.

The Office Action also states “the hydrophilic regions of Brennan will be interpreted as being non-wetting at least to hydrophobic liquid of interest.” *Office Action*, page 14.

Again, Applicants respectfully disagree. If the liquid of interest were hydrophobic, the F regions disclosed in *Brennan* would be wetting with respect to such liquid. This liquid would cover all the surface of the array except the hydrophilic dots (2) in Figure 6. It can be assumed that the hydrophilic zone in *Brennan* is so important that the hydrophobic liquid of interest would cover all the array surface. In these conditions, the device disclosed in *Brennan* would not present a substrate comprising an active surface that is substantially non-wetting with respect to a liquid of interest. Moreover, even in this case, the device disclosed in *Brennan* is still different from the device as recited in claim 1.

The Office Action also states “[p]aragraph 99 of the instant specification states that ‘the at least one operating zone can be a zone that is substantially non-wetting or wetting with respect to the liquid of interest’.” and “it does not appear that the operating zone being non-wetting represents a patentable distinction compared to the prior art.” *Office Action*, page 14.

Again, Applicants respectfully disagree. Claim 1 specifically recites one of the two alternative embodiments disclosed in the above-mentioned paragraph of the specification. Specifically, claim 1 recites a device comprising operating zones which are non-wetting for the liquid of interest. For example, the device of claim 1 corresponds to Example 5 of the present application, which exemplifies the preparation of an operating device with a hydrophilic capture zone hydrophobic silanized operating zone.

The feature concerning the wettability of the operating zone in the device as recited claim 1 is a feature which must be taken into account when considering the patentability of the present invention. The Office can not ignore this feature.

Accordingly, *Brennan* fails to teach the above-recited elements of claim 1. Because it fails to disclose at least these elements of claim 1, *Brennan* cannot anticipate claim 1 or any claims dependent on claim 1. Claim 1 and its dependent claims 4, 10-12, 15, 17, 19, 20, 29, and 32 are allowable over *Brennan*. Applicants respectfully request withdrawal of this rejection.

The Office Action also rejects claims 2, 3, 5, and 16 under 35 U.S.C. §103(a) as being obvious over *Brennan* in view of U.S. Patent No. 6,565,813 to Garyantes (*Garyantes*). Applicants respectfully traverse the rejection.

In order to establish *prima facie* obviousness of the claimed invention, all the elements must be taught or suggested by the prior art. The combined teaching of *Brennan* and *Garyantes* fails to teach or suggest every element of claims 2, 3, 5, and 16, and thus, cannot render these claims obvious.

Claims 2, 3, 5, and 16 variously depend on claim 1 and thus incorporate all the elements of claim 1. As discussed above, *Brennan* fails to teach at least the above-recited elements of claim 1. *Garyantes* does not cure the deficiency of *Brennan*. The Office Action cites *Garyantes* for disclosing a device comprising a plurality of wells having an annular circular shape and surrounding several hydrophilic zones with a hydrophobic zone. *Office Action*, page 4. *Garyantes* also fails to teach or suggest the above-recited elements of claim 1. Accordingly, claim 1 is also patentable over the combined teaching of *Brennan* and *Garyantes*. Being dependent on claim 1, claims 2, 3, 5 and 16 are also patentable over the combined teaching of *Brennan* and *Garyantes* for at least the same reasons as claim 1. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action further rejects claims 6, 8, 9, 13, 14, 18, 21, 22, and 25 under 35 U.S.C. §103(a) as being obvious over *Brennan* in view of U.S. Patent No. 6,017,696 to Heller (*Heller*). Applicants respectfully traverse the rejection.

Claims 6, 8, 9, 13, 14, 18, 21, 22, and 25 variously depend on claim 1, and incorporate all the elements of claim 1. As discussed above, *Brennan* fails to teach or suggest the above-recited elements of claim 1. *Heller* also does not cure the deficiency of *Brennan* with respect to claim 1. The Office Action cites *Heller* for disclosing placing electrodes in

microlocation zones to control electrophoretic transport of molecules in a sample liquid. *Office Action*, page 6. *Heller* also fails to teach or suggest the above-recited elements of claim 1. Accordingly, the combined teachings of *Brennan* and *Heller* cannot render claim 1 obvious. Dependent claims 6, 8, 9, 13, 14, 18, 21, 22, and 25 are patentable over the combined teaching of *Brennan* and *Heller* for at least the same reasons as claim 1. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action also rejects claims 23 and 24 under 35 U.S.C. §103(a) as being obvious over *Brennan* in view of *Heller*, and further in view of U.S. Patent No. 5,440,025 to Marx et al. (*Marx*). Applicants respectfully traverse the rejection.

Claims 23 and 24 variously depend on claim 1 and thus incorporate all the elements of claim 1. As discussed above, the combined teaching of *Brennan* and *Heller* fails to teach or suggest the above-recited elements of claim 1. *Marx* does not cure the deficiency of *Brennan* and *Heller* with respect to claim 1. The Office Action cites *Marx* only for disclosing extracting a nucleic acid with an electrically conductive polymer and polypyrrole as the electrically conductive polymer. *Office Action*, page 9. Like *Brennan* and *Heller*, *Marx* also fails to teach or suggest the above-recited element of claim 1. Accordingly, even in further combination with *Marx* the combined teachings of *Brennan* and *Heller* cannot render claim 1 obvious. Claims 23 and 24 are thus also patentable over the combined teaching of *Brennan*, *Heller*, and *Marx* for at least the same reasons as claim 1. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action rejects claims 30-35, 38, 42, and 45 under 35 U.S.C. §103(a) as being obvious over *Brennan*. Applicants respectfully traverse the rejection.

Like claim 1, claim 30 recites “a substrate comprising an active surface that is substantially non-wetting with respect to a liquid of interest, a plurality of capture zones for the localized capture of a drop of said liquid of interest formed on said active surface, the capture zones being placed apart on the active surface and being wetting with respect to said liquid of interest, a plurality of operating zones formed on said active surface and separate from the capture zones arranged so that said capture zones surround the operating zones continuously or

discontinuously, in such a way that the operating zones are at least partially covered by the drop of the liquid of interest when said drop is captured by said capture zones, each operating zone being a zone in which physical and/or chemical and/or optical operations are carried out in the drop of the liquid of interest, means for supplying the liquid of interest that make it possible to leave a drop of said liquid of interest on said capture zones, wherein at least one operating zone is a zone that is substantially non-wetting with respect to said liquid of interest.” Similar to the discussion above, *Brennan* fails to teach or suggest these elements of claim 30. Because *Brennan* does not teach or suggest all the elements of claims 1 and 30, it cannot render these claims obvious. Accordingly, claims 1 and 30 are patentable over *Brennan*. Claims 31-35, 38, 42, and 45 variously depend from claims 1 and 30, and thus, are also patentable over *Brennan* for at least the same reasons as claims 1 and 30. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action rejects claim 36 under 35 U.S.C. §103(a) as being obvious over *Brennan* in view of U.S. Patent No. 5,624,815 to Grant et al. (*Grant*). Applicants respectfully traverse the rejection.

Claim 36 indirectly depends on claim 1. As discussed above, *Brennan* fails to teach or suggest the above-recited elements of claim 1. *Grant* does not cure the deficiency of *Brennan* with respect to claim 1. The Office Action cites *Grant* for disclosing utilizing a suction pump for liquid withdrawal in order to efficiently remove excess liquid. *Office Action*, page 11. Notably, *Grant* also fails to teach or suggest the above-recited elements of claim 1. Accordingly, claim 1 is patentable over the combined teaching of *Brennan* and *Grant*. Claim 36 is therefore also patentable over the combined teaching of *Brennan* and *Grant* for at least the same reasons as claim 1. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action rejects claims 39-41 and 46 under 35 U.S.C. §103(a) as being obvious over *Brennan* in view of U.S. Patent No. 5,545,531 to Rava et al. (*Rava*). Applicants respectfully traverse the rejection.

Claims 39-41 and 46 variously depend on claims 1 and 30. As discussed above, *Brennan* fails to teach or suggest the above-recited elements of claims 1 and 30. *Rava* does not

cure the deficiency of *Brennan* with respect to claims 1 and 30. The Office Action cites *Rava* for disclosing forming a multiple biological chips wherein probes are exposed on the surface of a substrate in order to bind analyte in a liquid sample. *Office Action*, page 12. Like the other references discussed above, *Rava* also fails to teach or suggest the above-recited elements of claims 1 and 30. Accordingly, claim 1 is also patentable over the combined teaching of *Brennan* and *Rava*. Thus, claims 39-41 and 46 are also patentable over the combined teaching of *Brennan* and *Rava* for at least the same reasons as claims 1 and 30. Applicants, therefore, respectfully request withdrawal of the rejection.

The Office Action rejects claims 42-44 under 35 U.S.C. §103(a) as being obvious over *Brennan*.

Claim 42 depends on claim 1 and claims 43-44 depend on claim 30. As discussed above, *Brennan* fails to teach or suggest the above-recited elements of claims 1 and 30. Accordingly, claims 1 and 30 and their dependent claims 42-44 are patentable over *Brennan*. Applicants, therefore, respectfully request withdrawal of the rejection.

The application is in condition for allowance and early, favorable action is respectfully solicited. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

Dated: April 11, 2011

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